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DIVERSIFYING DRYLAND DIRECT-SEED SYSTEMS: STEVE AND NATE RIGGERS

FARMER-TO-FARMER CASE STUDY SERIES: INCREASING RESILIENCE AMONG FARMERS IN THE PACIFIC NORTHWEST

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DIVERSIFYING DRYLAND DIRECT-SEED SYSTEMS: STEVE AND NATE RIGGERS

By,

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Abstract

Steve and Nate Riggers grow winter and spring wheat on the Camas Prairie in Idaho and have incorporated spring broadleaf crops such as peas, lentils, and canola. They also grow less-common crops like buckwheat, turf grass seed, crested wheatgrass seed, and alfalfa in an area that receives about 22 inches of rain annually. Although many farms in the area incorporate some non-wheat crops in their rotations, the Riggers farm is unusual in its level of diversity. The brothers say that they see yield benefits across their rotation from practicing no-till and keeping land out of winter wheat for multiple years.

This case study is part of the Farmer-to-Farmer Case Study project, which explores innovative approaches regional farmers are using that may increase their resilience in the face of a changing climate.

Case study information presented is based on growers' experiences and expertise and should not be considered as university recommendations. Mention of trade names or commercial products is solely for the purpose of providing specific information and does not imply recommendation or endorsement.

Grower quotes have been edited slightly for clarity, without changing the meaning.

Readers interested in other case studies in this series can access them on the [REACCH](#) website or in the [WSU Extension Learning Library](#).

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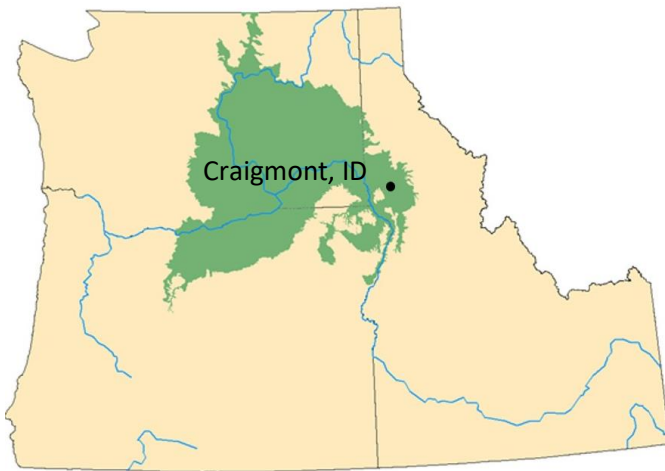
Photo: Darrell Kilgore

Location: near Craigmont and Nezperce, ID

Average Annual Precipitation: 20–22 inches

Cropping System: Diverse wheat-based rotations, including winter and spring cereals along with spring lentils, spring peas, spring canola, buckwheat, turf grass seed, crested wheatgrass seed, and alfalfa.

In this companion video, [Growing Diverse Crops, Farmer-to-Farmer Case Study Series](#), Steve and Nate Riggers discuss some of the major benefits and challenges associated with growing a wide array of crops in a dryland environment.



Map: Kaelin Hamel-Rieken, Washington State University

Introduction

Brothers Steve and Nate Riggers are fourth-generation farmers on Idaho’s Camas Prairie. The farm’s 6,700 acres have predominantly silt loam soils that are high in organic matter but relatively shallow, just one- to three-feet deep before heavy clay and rocks interfere with plant growth (Uhlorn-Nez Perce complex, Uhlorn-Vollmer complex, Uhlorn silt loam, Southwick-Driscoll complex, Nez Perce silty clay loam) (Hahn 2004). Elevation ranging from 3,300 to 3,800 feet results in a relatively short, cool growing season. Although they have always experimented with non-wheat crops, in recent years, the Riggers have substantially increased the diversity of crops grown on their farm. While they still grow a considerable amount of red and white wheat as their main crops, they also include barley, lentils, peas, and canola, and less-common crops including buckwheat, turf grass seed, crested wheatgrass seed, and alfalfa. Higher levels of crop diversity allow them to rotate land out of winter wheat for multiple years, improving soil health and giving them better control over weeds, diseases, and pests. This has resulted in increased crop yields across the rotation.

A Foundation of Direct Seeding

The Riggers’ great-grandfather’s homestead is located just a few miles from their current farm, and Steve and Nate are committed to honoring their family history by conserving the land for future generations. This includes Nate’s son Christopher, who has been an active partner on the farm since 2017. In 1997, the Riggers adopted direct seeding across their entire farm. Their first years of direct-seed experimentation are profiled in an earlier case study (Mallory et al. 2000) and their thoughts on that case study now are summarized in the sidebar *Steve and Nate’s Reflections on the 2000 Case Study*. Though they were relatively early to adopt direct seeding, Nate emphasizes that they did not invent this strategy themselves. “We experimented, but we didn’t invent our direct-seed system. We took pieces from Doug Wilcox, a farmer in Palouse, Washington, and from other farmers in the Midwest, and created our own system here.”

Steve and Nate's Reflections on the 2000 Case Study

In 2000, not long after Steve and Nate had transitioned all their acreage to direct seeding, they were profiled as part of a [case study series](#) about direct seeders.

Reflecting on that case study now, Steve says that the challenge of direct seeding spring crops has not been as great as they anticipated at the time. "We thought we were going to really struggle getting that spring crop in, the soil would be too wet, the residue was going to keep it from drying out... And instead we've found that we're getting into fields earlier." The brothers attribute this to two specific benefits from direct seeding. First, the standing stubble in the winter captures snow, keeping it distributed more evenly across the fields. As a result, they avoid large snowdrifts that create wet areas in the draws that are slow to dry out in the spring. Second, water percolates through the improved soil structure more easily, and the seedbed is ready to plant earlier.

The Riggers have also evolved their thinking by focusing a little bit less on cutting costs than they used to. Nate says this has been driven by cycles in markets. "With the beginning of the 'super cycle' in commodity markets around 2006 and 2007, we focused less on what our cost per acre was and more on maximizing yield. Now that prices have come back down, we're not going all the way back to that first mindset, but maybe we're settling somewhere in the middle where we're looking again at our cost of production and efficiency, and being more mindful of that."

Steve sums up their experience with direct seeding, "It's just amazing how well it works, and I think the guys who are still trapped in a conventional system and doing a lot of tillage are really at a disadvantage." For the Riggers, improvements in soil structure and water infiltration from direct seeding allow them to get into the field earlier in the spring and have led to higher efficiency and lower costs. Through direct seeding, they have been able to expand the farm substantially, with no increase in manpower or machinery. Although they do hire custom operators with some specialized equipment, they carry out most farm operations with two

tractors, one 60-foot drill, and a 120-foot sprayer. Recently, the Riggers have adopted real-time kinematic (RTK) guidance so that they can precisely seed in the spaces between the previous crop's rows, reducing their need to harrow in an area where high amounts of residue can create challenges for direct seeding. See the sidebar *The Riggers' Use of Precision Agriculture* for a video and additional information.

Their direct-seed system also provides an effective foundation for increasing crop diversity by improving soil health. Given the region's annual rainfall, increased soil health has made it possible to grow some new crops that would typically dry out and not produce well under tilled conditions. Reducing the intensity of soil preparation also frees up time for planning and other chores and makes it easier to plant each crop at its optimal time.

Crop Diversity in Their Current System

In the Camas Prairie, there is typically sufficient seasonal precipitation to produce annual crops without a preceding fallow year. Winter wheat is the dominant crop, due to higher yields resulting from a longer growing season and greater precipitation in the winter months. Where winter wheat dominates, it is typical for growers to include spring pulses or spring canola as a break crop in the rotation. Across the dryland annual cropping area of the Pacific Northwest, acreages of spring pea, chickpeas, and canola have increased over the last decade (Kirby et al. 2017).

The Riggers grow a greater number of non-wheat crops and rotate out of winter wheat for more years than most producers, which they feel has several benefits. Nate describes their approach, "When we grow two years of winter wheat in a four- or five-year crop cycle, we'll grow the winter wheat together in two consecutive years and then try to get at least two, if not three, years away from winter wheat completely by growing other crops." The Riggers feel that rotating to spring wheat is beneficial from a weed and disease perspective, even if it is another cereal. Winter annual weeds such as jointed goatgrass (*Aegilops cylindrica*), downy brome (*Bromus tectorum*), and Italian ryegrass (*Lolium perenne multiflorum*) can be better controlled in

The Riggers' Use of Precision Agriculture

The Riggers have adopted GPS technology across the farm, using it to avoid overlap, improve driving efficiency, and better control application rates for herbicides. As Steve says, "It's a win-win for everybody. It makes our farm more profitable, and it's better for the environment. In terms of technology, I can't think of anything in the last ten years that's been bigger."

They have also used some basic zone management for nitrogen, working with a consultant associated with an agricultural equipment and input supply company. Working from aerial imagery over multiple years, the consultant defined three zones: low, medium, and high. Based on pre-plant soil tests, initial nitrogen application rates are defined for each zone. Mid-season, tissue tests are used to define a late application of nutrients, informed by the fertility level of plants, the desired protein levels, and the yield predictions. While this system works well, they also comment that they would welcome additional objective information from researchers about how to use zone management as effectively as possible.

In 2015, they also began experimenting with Real-time Kinetic (RTK) guidance to plant seed in between the rows of the previous crop. (You can watch a [video of their planting with RTK guidance](#).) One goal is to reduce the amount of stubble uprooted during planting, as this interferes with seedling emergence. Beyond that, they hope to be able to leave more standing stubble, in order to create a better micro-climate for seedlings while protecting them from the wind, preserve shallow rootzone water, and provide shade for the young seedlings.

The Riggers have been very pleased with their first few years of experience with RTK guidance. They find that it improves seed-to-soil contact, resulting in better emergence and more consistently high plant populations. While they still harrow, they have been able to substantially reduce the intensity of this operation, using it primarily to bury weed seeds rather than to manage residue.

spring crops, including spring wheat. Similarly, diseases such as cephalosporium stripe and take-all are much more problematic in their winter wheat crop, and they see pathogen levels reduced when they rotate to spring wheat.

The Riggers have substantially increased their non-wheat crop acreage in the last few years to include crops that offer higher profit margins compared to the relatively modest profit projections for wheat. In 2015, about 35% of their acreage was in hard red and soft white winter wheat, and 35% was in spring cereals including barley and hard red and soft white spring wheat. In addition, 15% to 20% was in broadleaf and legume crops, including spring canola, dry green peas, Austrian winter peas, and lentils, and about 10% to 15% of their acreage was in one of three perennial crops: turf grass seed, crested wheatgrass seed, or alfalfa. Always open to trying new things, in some years they have also experimented with other crops like quinoa, buckwheat, and camelina. Complementing their observations and experiences, the sidebar *Additional Resources for Those Interested in Adding New Crops* provides detailed sources of agronomic information.

Barley

Steve and Nate grow both feed and malting spring barleys, and more recently have experimented with food-grade barley, which offers the highest price of the three (Figure 1). They are still trying to improve stand establishment for food-grade barley, finding it to be a little more finicky than the other two types. Although barley is still a cereal, it produces more residue than spring wheat, helping to build and protect the soil. Spring barley also matures earlier, allowing harvest ahead of spring wheat. Barley performs well in their direct-seed systems. Grain-fill in malting barley has been reliable at achieving kernel plumpness and protein necessary for malt.

Additional Resources for Those Interested in Adding New Crops

The chapter [Rotational Diversification and Intensification](#) in *Advances in Dryland Farming in the Inland Pacific Northwest* (Kirby et al. 2017) explores some of the more common non-wheat crops, providing information on planting, rotational fit, weed management, nitrogen management, rotational impacts on wheat yields, economics, and other topics. The chapter covers grain legumes, canola and other oilseeds, alternate cereals, and cover crops.

There is a wealth of information about diverse dryland crops available from Washington State University, Oregon State University, and the University of Idaho. In addition to browsing the [Extension Publications Library](#), these websites are likely to contain additional up-to-date information:

- [Oregon State University AgBiz Logic Website](#)
- [Oregon State University Wheat Research Website](#)
- [REACCH Farm Enterprise Budgets](#)
- [REACCH Grower Case Studies](#)
- [University of Idaho Brassica Breeding and Research Website](#)
- [University of Idaho AgBiz Website](#)
- [Washington State University Washington Oilseed Cropping Systems Website](#)
- [Washington State University Small Grains Website](#)

Turf and Crested Wheatgrass Seed

The Riggers have been growing Kentucky bluegrass seed for turf since the 1950s and, more recently, have also grown a turf-type, tall fescue. Though grass crops take a year to establish, they find that grasses do well in their area. Plus, growing grasses takes acreage out of wheat production for several years, which helps control weeds and diseases in wheat. Recently, they discovered that crested wheatgrass seed is a productive seed-producing crop for the Camas Prairie (Figure 2). The seed, which they sell on the open market, is used for reclamation in dry areas across the western US as well as dryland pasture, CRP, and forage. The grass provides erosion control, wildlife habitat, and forage (Ogle et al. 2017).



Figure 1. Food barley planted between rows of residue remaining from the previous wheat crop. Photo: Nate Riggers.



Figure 2. Crested wheatgrass on the Riggers farm in early July 2015. Photos: Darrell Kilgore.

Alfalfa

The Riggers also grow alfalfa for hay and are enthusiastic about its potential. As Steve says, “I’m wondering why we didn’t start growing it sooner. It builds organic matter and fixes nitrogen. And we’ve used the Roundup Ready trait that allows us to clean up ground very cost effectively. We’ve noticed that coming off of alfalfa we see yield increases in every crop we grow for four or five years.” With the Roundup Ready trait they can use glyphosate—an herbicide with a different mode of action than the herbicides they typically use—to control weeds in the growing crop. The Roundup Ready trait thus helps reduce concerns about herbicide-resistant weeds, while improving control of grassy weed problems.

Roundup Ready alfalfa seed is the most expensive seed of all the crops the Riggers grow, with costs dependent on seeding rate. Like bluegrass and crested wheatgrass, they find that alfalfa needs some extra attention during its first year, primarily to ensure that weed and insect issues are addressed when the crop is less robust. However, once established, it is well-suited to their area and relatively easy to grow, with the most time-intensive task being the harvest itself (Figure 3). The first cutting yields around three tons per acre. Most years they also have a second cutting of three quarters to one ton per acre, though this is sometimes limited within the field to areas with better soil types.



Figure 3. Alfalfa being swathed on the Riggers farm in early July 2015. Photo: Darrell Kilgore.

Spring Canola and Camelina

Beyond its status as a non-wheat crop, the Riggers have found that planting canola varieties with the Roundup Ready trait has been useful for controlling weeds. They typically grow spring canola (Figure 4), because they have sometimes experienced stand establishment issues with winter canola.



Figure 4. Spring canola on the Riggers farm in early July 2015. Photos: Darrell Kilgore.

However, they reserve winter canola as an option for planting when they find it necessary to fallow a field, which can happen if the spring is wetter than usual. When planted with appropriate timing (late July or early August on their farm), a winter canola crop will get a good head start before frost, leading to improved winter survival and high seed yields. Spring canola requires an early planting date, often at the same time as spring wheat. Over the fifteen to twenty years that they have been growing canola, yield has increased substantially, more reliably

offsetting high input costs for canola seed and fertilizer. At times they have also grown a small amount of camelina, despite the limited market.

Austrian Winter Peas and Other Pulses

The Riggers grew Austrian winter peas in the 1990s, without much success. However, rising national demand for this legume as a cover crop led to higher prices for a few years, which encouraged them to try the crop again (Figure 5). This is the only winter legume they currently grow, and they like the diversity it adds to their rotations—it fixes nitrogen and produces quite a lot of biomass compared to other peas.



Figure 5. Austrian winter peas on the Riggers farm in early July 2015.

Other pulses are also important on the Riggers farm, and they tend to see these playing a similar rotational role as canola, enhancing diversity and providing different management opportunities. As Nate describes, “Five, six years ago we were shifting away from pulses and moving more heavily into producing canola, and the last couple of years we’ve shifted back to pulses quite a bit. I think we’ll just continue with a mix of both—depending on the year and the price incentives. They both have a fit.”

Buckwheat

Buckwheat is another broadleaf crop that the Riggers have recently added to their rotations (Figure 6). The Riggers do not add nitrogen and, so far, they have had no need to spray for pests, resulting in a crop with very low input costs. Steve says, “That gets your attention because so many of these crops have good revenue potential, but you need a lot of capital

to get that crop to harvest—and if you have a drought or a hailstorm it can be a big loser.”

The fact that buckwheat is planted in late May or early June is a benefit, as it can provide a late-spring planting option when they have cold, wet conditions that delay spring planting. A later planting date also provides a longer spring window for controlling multiple flushes of both broadleaf and grassy weeds prior to planting a crop, which spreads out their workload. The Riggers also feel that this crop reduces their weather-related risk. Steve comments, “Buckwheat doesn’t depend as much on June precipitation. Instead, it’s more dependent on precipitation later in the season—and although we don’t get this in a typical year, it seems like if we have a really dry June we can just about count on above-normal precipitation in July and August.”



Figure 6. Buckwheat growing on the Riggers farm in 2015. Photo: Darrell Kilgore.

Because buckwheat is killed by winter temperatures and is susceptible to broadleaf herbicides, the Riggers have found that contamination levels of buckwheat seed in a following crop are generally low. Because Japanese consumers consider buckwheat to be an allergen, the Riggers take the extra precaution of informing the grain elevator when they are delivering wheat from fields that had buckwheat the previous year, and they are told that these loads are sent to other countries.

Ongoing Experimentation with Other Crops

Despite already having high crop diversity, the Riggers continue to look for additional crops that could make sense for their farm. Often, this means asking questions when they see a new crop being

grown by someone else in their area. Nate comments, “If farmers want to consider increasing diversity they need to step up their curiosity level and ask more questions. I’m a little surprised that there are not more questions asked about some of the crops we’re growing.”

In addition to asking questions, they grow small amounts of other crops to see how they perform and learn how to grow them. For example, they have tried quinoa in small acreages (Figure 7). In 2017, they also planted sunflowers, and were pleased enough with the results that they plan to continue experimenting with that crop (Figure 8).



Figure 7. Quinoa on the Riggers farm in early July 2015. Photo: Darrell Kilgore.



Figure 8. Sunflowers on the Riggers farm in 2017. Photo: Nate Riggers.

The Riggers have also experimented with cover crops on a limited basis. In 2017, after wet spring conditions led to a fair amount of unseeded acreage, they planted a cover crop in mid-June. The seed mix they used was primarily Austrian winter peas and oats, but also contained winter lentil, buckwheat, mustard, canola, and forage radish. With hot, dry conditions in the summer, growth was somewhat less than expected, and they terminated the cover crop in mid-August to conserve water for the subsequent winter wheat crop.

Benefits

With better weed and disease control resulting from growing diverse crops, the Riggers have higher crop yields throughout their rotations (Figure 9). To achieve this benefit, the Riggers feel that it is critical to keep land out of winter wheat for a minimum of two to three years. As Nate says, “My sense is that diversity—in the sense of growing other crops than winter wheat for at least three years—is improving the soil environment so when we do come back into winter wheat for two years in a row, we’re optimizing both these years in terms of yield...and those yields exceed our expectations given whatever weather we might have.” For more information, see the sidebar *How Crop Diversity Impacts Soil Health*.



Figure 9. The Riggers find that growing other crops benefits yields for their winter wheat crop, especially when they are able to grow other crops for two or more years before going back into winter wheat. Photo: Nate Riggers.

How Crop Diversity Impacts Soil Health

Kristy Borrelli, Penn State University Extension

Crop rotations that include a diverse mixture of crops can improve the health of the soil ecosystem. Different crops vary in form, function, and physiology that ultimately impact their growth period, root structure, and above- and below-ground biomass production. Adding crops with features that increase soil organic matter, reduce soil erosion, alleviate compaction, and improve nutrient cycling can greatly improve soil health and provide a number of specific benefits depending on the crops grown. The Natural Resource Conservation Service (NRCS) recommends following four basic principles to improve soil health and sustainability, each of which is described in more detail, below (USDA-NRCS 2013).

Manage soils more by disturbing them less. Reducing tillage allows organic matter to accumulate, which is key to maintaining a healthy soil. The Riggers have substantially reduced soil disturbance already by direct seeding. Despite its importance, reducing tillage is only one piece of maintaining healthy soil, and its effects can be greatly enhanced by increasing plant diversity, incorporating living plants, and maintaining soil cover.

Use plant diversity to increase diversity in the soil. Using multiple plant types and forms can diversify benefits to soil health, because each species behaves differently. For example, cereal crops produce abundant amounts of carbon-rich biomass aboveground and have large fibrous root systems that allow them to access water and nutrients deep within the soil profile. Legumes can fix plant-available nitrogen with a bacterial root symbiont and supply nitrogen-rich biomass to the soil. Finally, other crops including non-legume broadleaves, like canola, have large tap roots that can break through difficult compaction layers. As the root grows, it not only physically breaks up the soil, but adds organic matter to deeper layers that can improve soil structure and soil health. Because they can grow for multiple years with little disturbance, perennial species often have a much greater opportunity than annual species to improve soil health with their extensive root systems.

Keep plants growing throughout the year to feed the soil. The timing of crop development impacts when crops are growing in the field. Living roots and fresh crop residues are important for providing simple nutrient compounds that are available to most living organisms. Root exudates contain high concentrations of simple sugars and proteins, providing an immediate source of food, compared to more degraded residues, which are typically higher in complex, stable forms of carbon. As a result, the presence of diverse, living crops throughout the year supports a diverse population of organisms. Increased activity by soil organisms results in improved soil structure and nutrient cycling.

Keep the soil covered as much as possible. Some of the main soil health concerns in the dryland region of the Inland Pacific Northwest are related to soil erosion and nutrient runoff. In combination with the strategies mentioned above, keeping the soil covered with a combination of living and decaying crop residues provides a protective barrier to the soil and can greatly help alleviate these concerns while building up organic matter. Meanwhile, plant-available nutrients in the soil can be sequestered by living cover, further reducing the risk of nutrient losses.

Although wheat prices still dominate their business outlook, diversification offers them more economic stability, because they can shift their overall acreage toward other more profitable crops when wheat prices are low. Price cycles and markets for canola and grass seed differ from those for wheat. Canola can fill a number of different market niches, including biofuels, cooking oils, lubricating oils, and livestock feed. Grass seed prices tend to be linked to

housing and other construction cycles. Crested wheatgrass seed is a less volatile market, as it is purchased mainly for rangeland restoration by state and federal agencies.

Other crops, including buckwheat and malting barley, are grown on contract, and they reduce market-related risk. Nate comments, “Sure they might go up in price and we’d be stuck with the

lower one, but for most of the specialty crops, it's a limited amount of acres and tonnage that they want, so the price doesn't tend to change much. If we can lock the price in at the start of the season and we know what our input costs are, it can be very helpful.”

Challenges

Perhaps the biggest challenge in their approach to diversity is to stay committed to their plan of growing substantial acreage of non-wheat crops. This was especially true from 2008 to 2013, when wheat prices were unusually high. Steve says, “Winter wheat is our competitive advantage, that's the thing that we can do really well. Our climate, rainfall, everything points to winter wheat. So the temptation is to raise winter wheat year after year. You see it happen elsewhere in our area—you can see fields that have been in this monoculture, for the most part, and the disease problems, and the grassy weed problems, and a lot of other things pretty soon take their toll, and it takes a lot of years to recover from that.”

Enhanced diversity also means that they have had to move away from a mindset that they can “do it all.” They are not afraid to seek advice from crop consultants, neighboring farmers, and others with more experience growing alternative crops. They also hire out equipment or custom hire when they cannot justify owning equipment required for crop-specific operations on a smaller number of acres.

A larger number of crops also increases management complexity, with tasks as varied as changing the settings on planting and harvesting equipment, coordinating seed orders, recordkeeping for herbicide applications and other operations, and ensuring that harvest happens in a timely way for each crop. Herbicide carryover in soil is an ongoing concern that they address by selecting herbicides without long residuals and consulting application records to ensure that they avoid planting sensitive crops within the plant-back window.

However, Steve points out that he enjoys the added complexity and interest, especially when he thinks

about the days before they were direct seeding. “I was going to get out of farming in 1994 because it was just drudgery. You know, we were spending three, four weeks in the fall plowing, and I wanted to go fishing, and then we'd spend days in the spring cultivating, back and forth, back and forth, and doing it two or three times, and then planting the crop.”

Managing Risk

In terms of reducing risk, Steve emphasizes that their original switch to direct seeding is probably the most important change they have made. “I know what the environmental risk is on the Camas Prairie and it's soil erosion, period... I can honestly look anybody in the eye and say in the last 20 years we have effectively eliminated soil erosion on our farm... We have had soil erosion events on the Camas Prairie even this year, when there was probably 100 to 200 tons of soil lost. And, you know, what's that worth? I mean, my gosh, if you asked a farmer, “What would you sell a truckload of soil for?” They'd say, “Well, I'm not going to sell my soil, that's my lifeblood.” And, yet, you still have people that just don't get it. In my opinion, that's the number one environmental problem in our area.”

Nate agrees, adding that diversity is complementary and further reduces the long-term environmental and biological risks that are associated with monocropping, or near monocropping. Although they both admit that adding new crops that they are not familiar with increases their short-term risks, they say that seeking out advice from others with experience has gone a long way toward keeping this risk at a manageable level.

They have also used crop diversity as a tool to reduce economic risk by intensively forecasting profit margins on a wide variety of crops and using that to inform their crop mix. Using some combination of crops with different markets, they can usually find a profitable mix from year to year, whatever the price forecasts are. (For more on how diversity can improve profitability, see the sidebar *Greater Crop Diversity Helps Growers Choose More Profitable Alternatives as Relative Prices Change*.)

Greater Crop Diversity Helps Growers Choose More Profitable Alternatives as Relative Prices Change

Kathleen Painter, University of Idaho Extension, Boundary County

As prices change over time, growers who grow a larger array of crops will be more likely to limit their losses and find profitable cropping combinations during market downturns. Recent changes in prices from 2011 to 2016 in the annual cropping region of eastern Washington, northern Idaho, and northeastern Oregon provide one striking example of situations in which enhanced diversity can be helpful. These results, and the study that generated them, are described in more detail in [Cost and Returns Baseline for the Dryland Grain Annual Cropping Region of the Pacific Northwest for 2011–2015 with a 2016 Comparison](#).

From 2011 to 2015, winter wheat was the most profitable crop, averaging \$64 per acre, assuming an 80 bushel-per-acre yield (Figure 10), using average prices received by farmers in the PNW (Figure 11 and Figure 12). Chickpeas were nearly as profitable as winter wheat, at \$63 per acre, followed by hard red spring wheat at \$60 per acre. Returns for hard red winter wheat were slightly less, at \$51 per acre. Lentils and soft white spring wheat were also profitable, at \$29 and \$27 per acre, respectively. Peas, spring barley, and spring canola were not profitable, on average, from 2011 to 2015 under the price and yield assumptions used in this study. They averaged -\$7 per acre for peas, -\$24 per acre for spring barley, and -\$35 per acre for spring canola. These averages mask significant crop price variability from year to year.

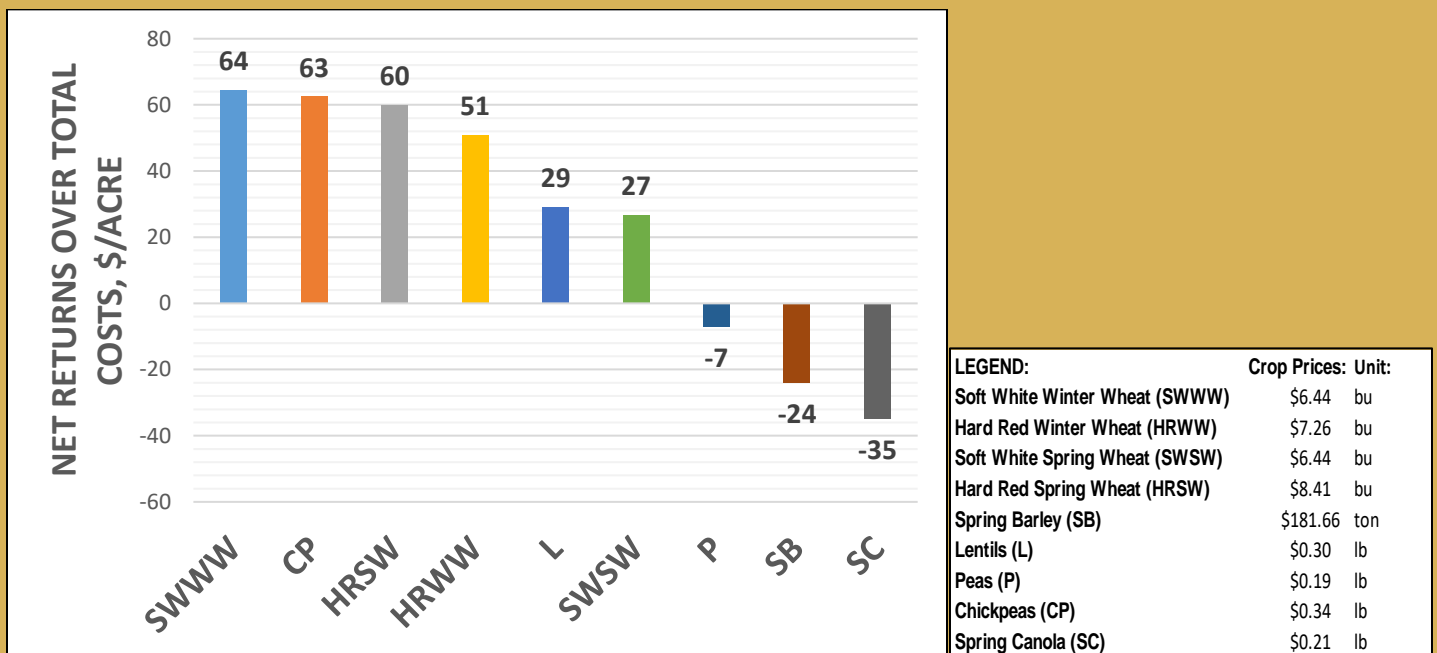


Figure 10. Net returns over total costs by crop, 2011 to 2015 average farmgate prices (\$/acre). From Painter, 2017.

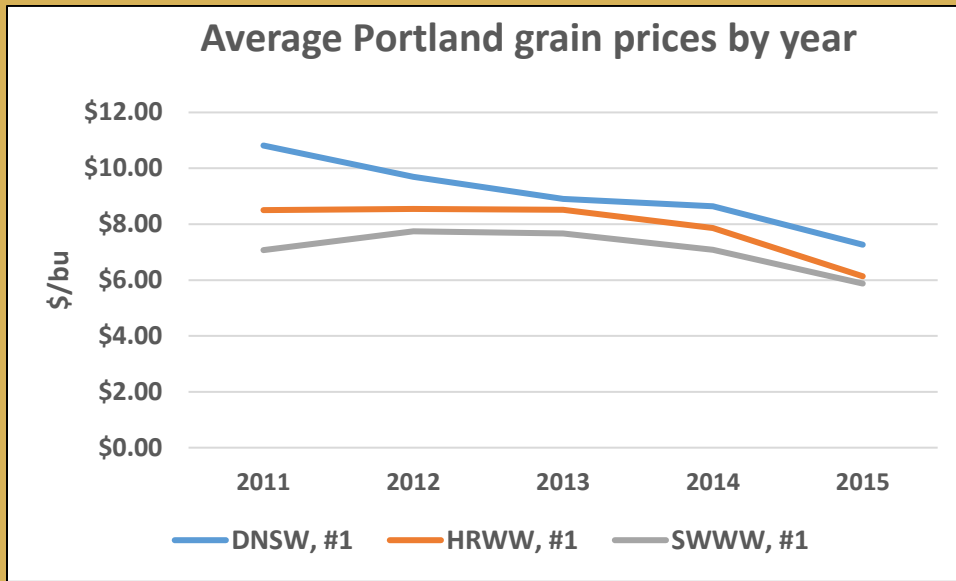


Figure 11. Average farmgate prices by wheat class, 2011 to 2015 (USDA-AMS). From Painter, 2017.

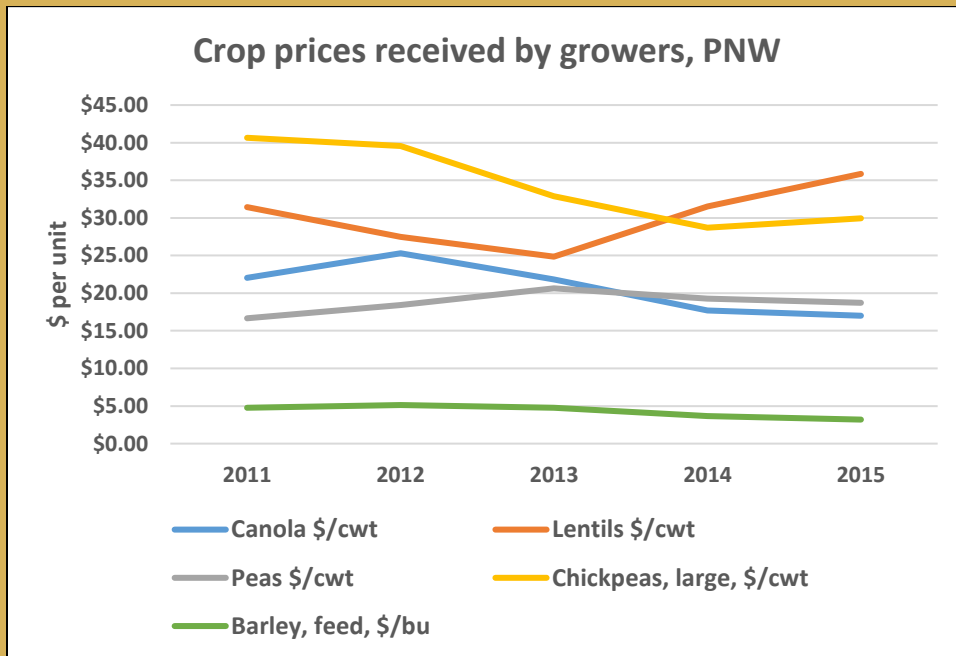


Figure 12. Average marketing year prices received by growers for 2011 to 2015 (USDA-NASS). From Painter, 2017.

While choices such as peas, barley, or spring canola may be unprofitable in the year that they are grown, rotational crops such as these can improve overall returns on a rotational basis. For example, producing Roundup-Ready spring canola can clean up a weedy field, increasing returns in subsequent years when other crops are planted. Average per acre returns for a three-year rotation were highest for a rotation of soft white winter wheat, hard red spring wheat, and chickpeas at \$62 per acre per year. Returns for a rotation of hard red winter wheat, hard red spring wheat, and chickpeas were next highest, at \$58 per acre per year.

In 2016, wheat prices fell dramatically, with a season’s average price of \$3.70 per bushel, nationally (USDA-ERS). Average farmgate prices for this study area were \$3.61 per bushel for soft white winter wheat. With this price, net returns over total costs for winter wheat, the main cash crop in the region, fell from being the most profitable crop, at \$64 per acre, to one of the least profitable crop choices at -\$82 per acre, a decline of \$146 per

acre (Figure 13). This crop is grown on over 40% of all acreage in the dryland crop producing region of the inland Pacific Northwest (USDA-NASS). Some individual non-grain crops were profitable, including peas (\$50 per acre) and chickpeas (\$40 per acre). However, rotational returns were negative for all crop rotations, with a rotation of hard red winter wheat, hard red spring wheat, and peas being the least negative, at -\$27 per acre.

During market downturns for wheat similar to those experienced in 2016, producers like the Riggers who have a larger array of crop choices available to them will be more likely to limit their losses and find profitable cropping combinations.

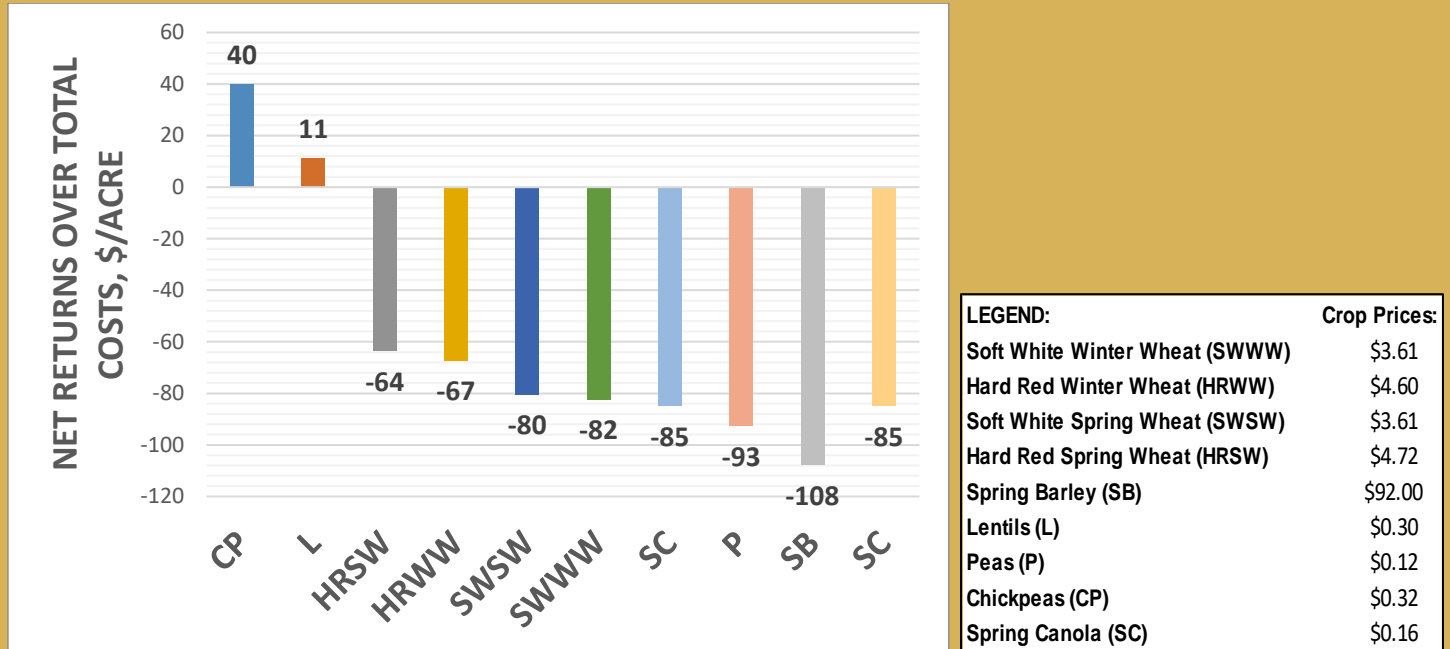


Figure 13. Net returns over total costs by crop, 2016 average farmgate prices (\$/acre). From Painter, 2017.

Looking Forward

Looking forward, the Riggers say that they worry less about the constraints of their production system than they do about the role of agriculture in a society that is disconnected from it. In particular, they worry that misinformed consumers, who do not understand the complexity and sophistication of modern farming, will advocate for a regulatory environment that limits their flexibility. Among regulatory threats, they fear that climate regulation may target farms, without a real understanding of the important role that agriculture could play in drawing carbon out of the atmosphere and sequestering it in soils, or what farms can and cannot do to limit their emissions.

They are relatively optimistic that they will be able to adapt to future changes in climate on their farm, using the strategies they have already developed. For example, in avoiding tillage and retaining stubble,

they are already trapping water from snow, reducing evaporation, and conserving water. Steve also points out that the impacts of climate and non-climate events in other wheat growing regions of the world that affect their markets can be as important to them as the direct impacts of weather on the Camas Prairie for wheat and other crops with worldwide production.

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